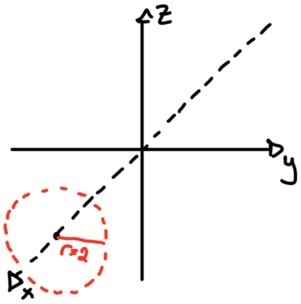
Taylor Larrechea
Dr. Gustafson
MATH 360 9.5 - 1,3,7,14,25,28,29 ✓
HW 9.5

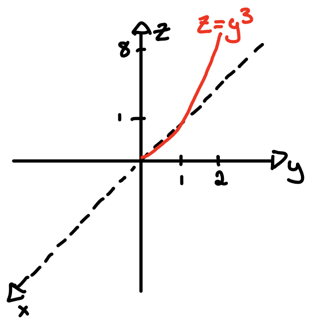
9.5 | #1 $[3+2\cos(t), 2\sin(t), 0]$: $(3+2\cos(t))\hat{i} + 2\sin(t)\hat{j} + 0\hat{k}$

The above vectors represents a circle centered at [3,0,0] with radius 2.



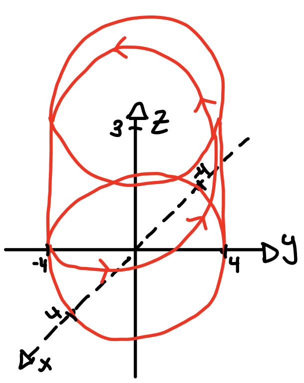
9.5 | #3 $[0,t,t^3]$: $0\hat{i} + t\hat{j} + t^3\hat{k}$

The above vectors represent a curved parabola in the yz plane. More specifically, a cubic parabola.



9.5 | #7 $[4\cos(t), 4\sin(t), 3t]$: $4\cos(t)\hat{i} + 4\sin(t)\hat{j} + 3t\hat{k}$

The above vectors represent a circular helix of height 3 with a radius of 4.

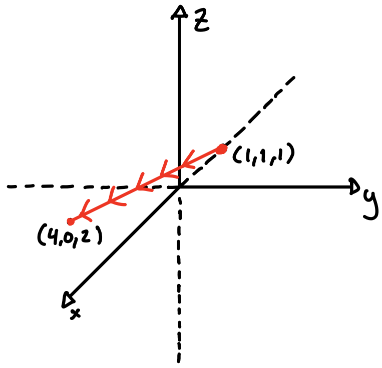


9.5 # 14

Strait line through $(1,1,1)$ to $(4,0,2)$

$0 \le t \le 1$

$[1+3t, 1-t, 1+t]$



9.5 # 25 $r(t) = [10\cos(t), 1, 10\sin(t)]$: $P(6,1,8)$

$r'(t) = [-10\sin(t), 0, 10\cos(t)]$

$u'(t)$: $|r'(t)| = \sqrt{(-10\sin(t))^2 + 0^2 + (10\cos(t))^2} = \sqrt{100\sin^2(t) + 100\cos^2(t)} = \sqrt{100(\cos^2(t) + \sin^2(t))} = \sqrt{100} = 10$

$u'(t) = [-\sin(t), 0, \cos(t)]$

Tangent of C at P :

$\vec{q}(w) = \vec{r}(t) + w\vec{r}'(t)$

$\vec{q}(w) = [10\cos(t), 1, 10\sin(t)] + w[-10\sin(t), 0, 10\cos(t)]$

$10\cos(t) = 6$ $\quad 1=1 \quad$ $10\sin(t) = 8$

$\cos(t) = 3/5$ $\quad\quad$ $\sin(t) = 4/5$

$t = 0.927$ $\quad\quad$ $t = 0.927$

$q(w) = [6,1,8] + w[-8,0,6]$

$\vec{q}(w) = [6-8w, 1, 8+6w]$

I can't Figure out how to sketch those.

$$\boxed{\begin{array}{l} r'(t) = [-10\sin(t), 0, 10\cos(t)] \\ u'(t) = [-\sin(t), 0, \cos(t)] \\ q(w) = [6-8w, 1, 8+6w] \end{array}}$$

9.5 # 28 $r(t) = [t, t^2, t^3]$ $P: (1,1,1)$

$r'(t) = [1, 2t, 3t^2]$

$u'(t)$: $|r'(t)| = \sqrt{1^2 + 4t^2 + 9t^4}$

$u'(t) = \frac{1}{\sqrt{9t^4+4t^2+1}} \cdot [1, 2t, 3t^2]$

$\vec{q}(w) = \vec{r}(t) + w\vec{r}'(t)$

$\vec{q}(w) = [t, t^2, t^3] + w[1, 2t, 3t^2]$

$t=1 \quad t^2=1 \quad t^3=1$

$t=1$

$\vec{q}(w) = [1,1,1] + w[1,2,3]$

$\vec{q}(w) = [1+w, 1+2w, 1+3w]$

I can't Figure out how to sketch those.

$$\boxed{\begin{array}{l} r'(t) = [1, 2t, 3t^2] \\ u'(t) = \frac{1}{\sqrt{9t^4+4t^2+1}} \cdot [1, 2t, 3t^2] \\ \vec{q}(w) = [1+w, 1+2w, 1+3w] \end{array}}$$

9.5 # 29 $r(t) = [t, \cosh(t)]$ $0 \le t \le 1$

$$L = \int_0^1 \sqrt{r' \cdot r'}\, d\tilde{t}$$

$\cos^2(t) + \sin^2(t) = 1$

$\cosh^2(t) - \sinh^2(t) = 1$

$r'(t) = [1, \sinh(t)]$

$r'(t)^2 = 1 + \sinh^2(t)$

$$L = \int_0^1 \sqrt{\cosh^2(t)}\, dt$$

$$L = \int_0^1 \cosh(t)\, dt$$

$$\sinh(t) \Big|_0^1 = \sinh(1) - \sinh(0) = 1.175 - 0 = 1.175$$

$$\boxed{L = 1.175}$$